RHIC QLI – Power Supply / Diagnostic Reports for (p^ Run 2001)
December-24 thru December-30

Monday: Dec 24, 2001

From the Main Control Room Operators: **(Corrector Power Supply yi2-qs3-ps)** should be kept off until the Power Supply group can take a look at it. The power supply has been compensated for until yi2-qs3 is working properly. 13:06:41- Now, to summarize, the situation of coupling in yellow is: yi2-qs3 (local skew at 2 o'clock) is BAD and we put it *OFF* yo1-qs3 is set to compensate for yi2-qs3 the skew families are set to minimize.

14:01:00 (**IR power supply yi3-qf7)** comment by...fp vp sa -- the ramp started very well (no losses in yellow first few stones - after orbit and coupling corrections). Yellow beam gets lost at stone 11 (g90) and pulls the permit, so blue followed. we are investigated now why the tune took a sudden turn 'south', hitting 0.2. Found that yi3-qf7 starts large oscillations exactly at that time. F. Pilat is consulting G. Genetis.

Monday: Dec 24, 2001: Beam Abort, 4b-time.A, QLI in Yellow ring, 4b-time.A (Actual Time: 15:06:28 +2852609)
QPA Faults: All yellow IR power supplies off with no fault indications, tq's remained on.
QD Alarms: No data listed, system in running mode.
DX Heaters: None fired (4b and 10a have no indication shown in "set state").
QdRealQuench: No data listed, system in running mode.
Postmortems: Power supplies sitting at Park.
Qdplots: N/A
Beam Loss Monitors: N/A
Quench Status: Not real.
Reason: Current regulator card for yi3-qf7 was replaced due to faulty K2 relay. Power supply was put into standby instead of off before replacing the card.

TECH NOTES: George Ganetis was notified and suspected that the current regulator card needed to be replaced. On Friday, 12-21-01, Postmortems indicated that the current regulator card Iref failed as if the K2 relay was beginning to fault. A card was set aside that morning for replacement if time permitted since it's only trip on Thursday 12-20-01 at 21:42:32. However, there were no additional complaints and MCR would not allow down time to change it. Jeff came in Saturday night and replaced the current regulator card. Later in the shop on Monday, 12-26-01, Jim found that indeed the K2 relay was bad and repaired it.

Tuesday: Dec 25, 2001 *MERRY CHRISTMAS!!!*

03:59:55- D. Bruno is looking into why Main Control can't bring bo11-tq6 on. This has been a problem since about 3 o'clock. 0450: T. Costanzo has swapped out cards for bo11-tq6. A Blue QLI originated at 1012a around the time that the supply was being worked on.

Tuesday: Dec 25, 2001: Beam Abort, 12a-ps1.A, QLI in Blue ring, 12a-ps1.A (Actual Time: 04:43:12 +2283410)
QPA Faults: None indicated, all Blue IR power supplies off including bo11-tq6-ps.
QD Alarms: Auxiliary (12a-qd1) B11TQ6_VT and (12a-qd1) B12DRDX_VT, Tq-23 with all others indicating positive.
DX Heaters: None fired (4b and 10a have no indication shown in "set state").
QdRealQuench: None listed on those that did fire, 8 detectors still in the running mode.
Postmortems: bo11-tq6 current and Iref drop then the wfg output m begins to oscillate all before T=zero.
In addition, the Main Power supplies also show nothing unusual.
Qdplots: BQMC=448.20amps, sitting at Injection. It appears that the link was pulled first.
Beam Loss Monitors: Sector 11 and 12 look okay, 9 and 10dmp's look good also.
Quench Status: Not real.
Reason: Work on power supply bo11-tq6 (current reg. card and fiber optics card replaced) caused the link to come down due to cross-talk between the 4-20mA cable and the dhx and dho power supplies.

TECH NOTES: D. Bruno pointed out that the PMViewer power supply snapshot data is not always logging the current trace properly (i.e. bo11-tq6 from tonight). The Hide/Show data sets option is also not available. RHIC trim quad power supply bo11-tq6 tripped and would not remain on when reset. After consulting D. Bruno, CAS swapped the current regulator and fiber optic interface cards for the supply.

Permit.3c-ps1 Snake Link Failure (Time: 05:16:36 +3685309)
Tuesday: Dec 25, 2001:
Blue Snake - Alcove 3C, b03-snk7-2.3-p.s. (Snapshot Data Time: 05:16:39)
Snap Shot: Indicates the supply went to OFF, the Iref dropped before current.
Current Settings: BMDC=473.44amps going from Injection to full energy. BO3-SNK7-2.3 current =325.82amps.
Qdplots V-tap: Both V-taps (7_2VT and 7_3VT) go positive around -0.099seconds.
Beam Loss Monitors: Sector 3, g3-m1mx.4 and g3-m1mx.3 shows no data, all others appear normal.
Quench Status: REAL MAGNET QUENCH
Reason: Power supply went to the OFF state and Quenches when tripped at maximum setpoint.

Blue Snake - Alcove 3C,bo3-snk7-1.4-p.s. (Snapshot Data Time: 05:16:43)
Snap Shot: Indicates that the Iref dropped before current.
Current Settings: BO3-SNK7-1.4 current =99.72amps
Qdplots V-tap: Indicate that perturbation took place for both V-taps around -3.581seconds before T= zero.
Beam Loss Monitors: Sector 3, g3-m1mx.4 and g3-m1mx.3 shows no data, all others appear normal.
Quench Status: REAL MAGNET QUENCH
Reason: Caused by bo3-snk7-2.3 quenching.

Tuesday: Dec 25, 2001: QLI in Blue ring, 4b-time.A dropped first (Actual Time: 05:17:44 +384629)
QPA Faults: None listed, all Blue IR power supplies off, Tq's remain ON.
QD Alarms: (4b-qd1) B3DSD9_5VT, Tq-23 all others indicate positive values.
DX Heaters: None fired (4b and 10a have no indication shown in "set state").
QdRealQuench: None listed on those that did fire, 8 detectors still in the running mode.
Postmortems: Show nothing unusual.
Qdplots: Ramping to top energy then trips to off. V-taps show no indication of Real Type Quench seen before.
Beam Loss Monitors: Sector 3, (g3-m1mx.4 and g3-m1mx.3), Sector 4, (g4-1mrf.2 and g4-1mrf.1) shows no data.
Quench Status: Not real
Reason: Cause due to the Blue Snake Quench above at 05:16:36.

Tuesday: Dec 25, 2001: QLI in Yellow ring, 7b-ps1 dropped first (Actual Time: 05:29:56 +1356244)
QPA Faults: N/A
QD Alarms: (5b-qd1) Y5DSA3_A2VT, Tq-12 and (7b-qd1) Y7DSA3_A2VT, Tq-23.
DX Heaters: None fired (4b and 10a have no indication shown in "set state").
QdRealQuench: all fired showing no indications except for 3c-qd1 and 9c-qd1.
Postmortems: N/A, Main power supplies look okay.
Qdplots: YDMC=473.45 sitting at Injection, begins to drop off around -5.285seconds.
V-taps do not indicate a real quench like previous plots.
Beam Loss Monitors: N/A, none available for that time.
Quench Status: Not real.
Reason: The wrong slow factor was used in ramping the yellow power supplies down. MCR used SF3 in ramping down from Injection to Park so they could run the Blue Quench recovery script for the trip above at 05:17:44.

From the Physics Logs:

14:30 The beam was lost again at the same step stone due to a loss monitor permit. MCR is investigating with T. Roser via telephone. 15:15 The problem has been discovered. MCR is contacting a. Marusic and J. Van Zeits for a solution. The details of the problem are logged in the RHIC 2001 Polarized Proton e-log. Measured polarization in the AGS was very low. V. Ranjbar is here to work on the AGS polarization.

From the Physics Logs continued:
16:30 Filling RHIC to ramp. The beam is unpolarized. 16:45 The beam was lost due to C33 PASS trip. The Chipmonk viewer does not show any beam loss. 17:00 MCR is investigating the cause for C33 to trip. 17:43:17- The only other time 6b PASS division B has dropped this run was during significant beam loss at 13:52 yesterday afternoon. (see this link) At that time it appeared to correlate with substantial yellow beam loss. TJS

20:02:01 comment by...LH -- Here, the tail end of the beam loss is visible in sector 5. This loss may have accounted for the chipmunk that pulled the permit in the last ramp. Could the beam be scraping against some aperture? Orbit for the ring looks clean and reasonable.
20:12:46 comment by...LH -- It should also be mentioned that this loss was persistent and pronouced throughout the ramp. Only after reaching flattop did the beam loss end.

Wednesday, Dec 26, 2001

Permit.3c-ps1 Snake Link Failure (Time: 16:02:32 +2661794)

Wednesday: Dec 26, 2001:
Blue Snake - Alcove 3C, b03-snk7-2.3-p.s. (Snapshot Data Time: 16:02:34)
Snap Shot: Indicates the supply went to OFF, the Iref and voltage dropped first followed by current, then approx. 3seconds later all three signals go negative to approx. 190amps.
Current Settings: BMDC =473.44amps sitting at Injection. BO3-SNK7-2.3 current =325.88amps.
Qdplots V-tap: Both V-taps (7_2VT and 7_3VT) go positive around -0.083seconds.
Beam Loss Monitors: Sector 3, g3-m1mx.4 and g3-m1mx.3 shows no data, all others appear normal.
Quench Status: REAL MAGNET QUENCH
Reason: Occurs when tripping at maximum setpoint.

Blue Snake - Alcove 3C, bo3-snk7-1.4-p.s. (Snapshot Data Time: 16:02:38)
Snap Shot: Indicates that the Iref dropped before current.
Current Settings: BO3-SNK7-1.4 current =99.60amps
Qdplots: Indicate that perturbation took place for both V-taps around -3.764seconds before T= zero.
Beam Loss Monitors: Sector 3, g3-m1mx.4 and g3-m1mx.3 shows no data, all others appear normal.
Quench Status: REAL MAGNET QUENCH
Reason: Caused by bo3-snk7-2.3 quenching.

From the Physics Logs: 1602: Blue Sector 3 snakes have tripped, one shows a quench indication. Cryo was notified. 1630: Ramping to park at the behest of Cryo operations. They estimate about 1 hour recovery time. 1703: Cryo reports all systems in the clear. Ramping for hysteresis.

Thursday, Dec 27, 2001

08:37:33- OK, beam is injected in blue and yellow - blue looks good, yellow does not fp

Maintenance period 1600hrs to 2300hrs

Accesses into RHIC and various work items:

- Work on Blue Snake Power Supply bo3-snk7-2.3.
  - Replaced 3U chassis, control card and digital isolation card, ran a new cable from the node card chassis in rack #2 to the new 3U Chassis, changed the AC power chassis, electrician checked the main breaker panel for loose connections on both breakers for the blue snake rack.
- Heater repair work for the Blue snake in sector 3 -Westinghouse hydraulic work on the rheostat -ATR magnets are having their strainers cleaned.

Thursday, Dec 27, 2001: QLI in Blue ring, 12a-ps1.A (Actual Time: 15:54:08 +3973414)
QPA Faults: boll-tq6-ps along with the rest of the blue IR power supplies OFF with no fault indications, all other blue Tq's including the yellow IR's and Tq's remain ON.
QD Alarms: (12a-qd1 Aux.) B11TQ6_VT and all main quench detectors tripped indicating positive values. The 12a-qd1 main detector never finished dumping data.
DX Heaters: None fired but 4b and 10a "set state" have no "ON" indications.
QdRealQuench: 12 detectors fired with no indications listed.
Postmortems: bo11-tq6-ps shut Off for repairs.
Qdplots: BDMC=473.44 ,sitting at Injection.
Beam Loss Monitors: N/A
Quench Status: Not real.
Reason: The QLI tripped due to cross talk in the 4-20ma signals between the bo11-tq6 and the dh0 causing the dhx magnet to quench.

Tech Notes: The bo11-tq6 power supply was brought to OFF so the Control Card could be replaced. It appears there is cross talk between this supply and the 1012 dh0 / dhx signals that would cause the main link to trip.

Permit.3c-ps1 Snake Link Failure *(Did Not Register)* (Time: +)

Thursday, Dec 27, 2001:
Yellow Snake - Alcove 3C, yi3-snk7-1.4-p.s. (Snapshot Data Time: 16:13:06)
Snap Shot: Indicates that the power supply shut off.
Current Settings: BMDC = 0 amps Snake Magnet Current = 99.707 amps.
Qdplots V-tap: N/A
Beam Loss Monitors: N/A
Quench Status: REAL MAGNET QUENCH.
Reason: Ac phase fault, phase C to neutral = 40.7 volts (should read about 116vac).

Tech Notes: Tapping on the main breaker panel circuit #12 for this power supply located on the wall, we saw the 40vac on phase C move around. An Electrician was called in and could see the Phase C screw on the 60amp breaker line side (main buss bar) not tightened. After shutting down the entire alcove for safety, he found the screw to be stripped. (This must of occurred during construction but was never discovered until now.) He then switched the breaker with circuit breaker #8 (not being used) and we were back in business.

Thursday, Dec 27, 2001: QLI in Blue ring, 8b-ps1 (Actual Time: 16:15:48 +1279276)
QPA Faults: QP11-R8BD2-b8-dhx-qp (CROWBAR) all other blue supplies off
QD Alarms: None indicated, system still in (RUNNING) mode.
DX Heaters: None fired but 4b and 10a "set state" have no "ON" indications.
QdRealQuench: None indicated, system still in (RUNNING) mode.
Postmortems: b8-dh0 starting around T-2seconds jumps up to around 60amps while the Iref remained constant.
Qdplots: Sitting at zero, not turned on.
Beam Loss Monitors: N/A
Quench Status: Not real.
Reason: The b8-dh0 current jumped up on turn on causing the b8-dhx voltage to become unstable since the two are connected together, causing a crowbar fault on the QPA.

Permit.3c-ps1 Snake Link Failure *(Did Not Register)* (Time: +)

Thursday, Dec 27, 2001:
Yellow Snake - Alcove 3C, yi3-snk7-2.3-p.s. (Snapshot Data Time: 16:48:59)
Snap Shot: Iref drops before current.
Current Settings: BMDC = 1952.36 amps, top energy. Snake Magnet Current = 326.36 amps.
Qdplots V-tap: Tripped on YI3SNK7R2_GL (gas cooled lead) but looks like the trip occurred after T=0.
Beam Loss Monitors: N/A, there was no beam at the time.
Quench Status: REAL MAGNET QUENCH.
Reason: yi3-snk7-1.4 tripping earlier.

Tech Notes: This Quench occurred due to the yi3-snk7-1.4 (16:13:06) tripping earlier by approximately 36 minutes. It is believed that a heat wave (hot gas ball) traveled causing it to quench. Also, see the next Quench that follows.

Thursday, Dec 27, 2001: QLI in Yellow ring, 4b-time.A (Actual Time: 16:49:28 +3412730)
QPA Faults: Yellow power supplies OFF with no indication, Blue and all Tq's remain ON.
QD Alarms: (4b-qd2) Y3DRBUO_9VT Tq-22, all others indicate positive values.
DX Heaters: None fired but 4b and 10a "set state" have no "ON" indications.
QdRealQuench: 12 detectors fired with no indications.
Postmortems: Ramping down from top energy of 1951 amps.
Qdplots V-tap: Indicates Y3DRBUO_9VT to drop at –7.364 seconds before T=0.
Beam Loss Monitors: N/A, there was no beam at the time.
Quench Status: REAL BUSS QUENCH.
Reason: yi3-snk7-1.4 tripping earlier.

Tech Notes: This Quench occurred due to the yi3-snk7-1.4 (AC Phase Fault at 16:13:06) tripping earlier by approximately 36 minutes tripping yi3-snk7-2.3. It is believed that a heat wave (hot gas ball) traveled causing it to quench.

22:45- QLI in Blue and Yellow while at injection.

Thursday, Dec 27, 2001: QLI in Yellow ring, 2b-ps1 (Actual Time: 22:45:04 +1386946)
QPA Faults: Yellow and Blue power supplies both off with no faults, Tq's remain ON.
QD Alarms: All tripped indicating positive Tq values, 3b-qd1 and 5b-qd1 never finished dumping data.
DX Heaters: None fired but 4b and 10a "set state" have no "ON" indications.
QdRealQuench: 18 detectors fired with no indications.
Postmortems: Nothing unusual
Qdplots: YDMC = 473.45 amps, sitting at Injection.
Beam Loss Monitors: N/A
Quench Status: Not real.
Reason: It appears to be a problem in the FEC (front end computer) where a power supply in the chassis was going bad, causing the permit module to drop out.

Tech Notes: No quench Summary displayed for 10a Blue and Yellow

Thursday, Dec 27, 2001: QLI in Blue ring, 8b-ps1 (Actual Time: 22:45:04 +1387170)
QPA Faults: Yellow and Blue power supplies both off with no faults, Tq's remain ON.
QD Alarms: All tripped indicating positive Tq values, 3b-qd1 and 5b-qd1 never finished dumping data.
DX Heaters: None fired but 4b and 10a "set state" have no "ON" indications.
QdRealQuench: 18 detectors fired with no indications.
Postmortems: No data, shows dates from 1969?
Qdplots: BDMC = 473.44 amps, sitting at Injection.
Beam Loss Monitors: N/A
Quench Status: Not real.
Reason: It appears to be a problem in the FEC (front end computer) where a power supply in the chassis was going bad, causing the permit module to drop out.

Friday, Dec. 28, 2001

Corrector Power Supply: yi2-tv2 possible problem.
10:27:02 comment by...vp -- yi2-tv2 still Off, the vertical orbit is bad, and there is no information about this corrector on the Alarm screen
10:25:48 comment by...vp -- yi2-tv2 was Off on two last ramps.

From the Physics Logs:
12:49:07 comment by...Johannes -- 35 seconds into the last ramp there was a glitch in the **b-qtrim power supply** current, that's where the tune-correction had a large deviation 13:12:39 comment by...Johannes -- This of course is typical for each ramp, its the ramp supply taking over I presume. Same thing later on at the end of the ramp when the ramp speed slows down again.

Info From MCR E-Log:
1) During the RHIC Ring entry, it was noticed that there are ice balls forming at O12Q4 and Q5 since the fans are not working there.
2) Corrector power supply **yo5-qs3** tripped during a ramp and was reset remotely.

Saturday, Dec 29, 2001

04:57:03 comment by... -- We lost **yo5-qs3** at 0452, causing sudden loss.

Sunday, Dec 30, 2001

10:17:01 comment by...fulvia -- **yo5-qs3** died on the last store, so we compensated with **yi6-qs3** (see above comparison of new to old settings) **yi2-qs3 and yo5-qs3 should be fixed**

The next is a series of events that caused sector 3 sextupoles to trip:

(First) 19:44:55- Beam Abort, 6b-ps1 dropped {Cryo Lead Flow} Sequencer

(Second) 19:51:17 Physics off. The store was lost due to a cryo lead flow permit interlock. The **3 o'clock sextupoles are indicating a quench and a lead flow interlock**. Ring access is required to check the lead flow controller power supply at 3Q12. Also, some re-cooler levels dropped.

(Third) 2117: Machine Setup. While troubleshooting the controller power supply, the problem cleared for an unknown reason. The MCR is attempting to restore the 3 o'clock power supplies that tripped. 22:16:28- The power supply for the lead flow controller at 3Q14 has been swapped twice before. While Cryo and CAS were troubleshooting the problem, it cleared without indication of the source. It will come back again.

FEC 10a-ps3 lost communications and was reset by the MCR. Two resets and one soft reboot were issued before the FEC would respond.
2145: Setup off. cfe-10a-ps3 is not communicating. The MCR is attempting to reset it.
2201: Machine Setup. cfe-10a-ps3 is responding. The RHIC magnets are ramping.

Sunday, Dec 30, 2001: Beam Abort, 3b-ps1, QLI in Blue ring, 3b-ps1 (Actual Time: 23:29:32 +2593956)
QPA Faults: N/A
QD Alarms: (3b-qd1) B2QFA3_A2VT, Tq-23, all others fired indicating positive values.
DX Heaters: None fired, 4b and 10a "Set State" with no indication.
QdRealQuench: 12 detectors fired indicating no values.
Postmortems: 1004b shows mains beginning to ramp up from Injection.
Qdplots: BQMC = 448.11 amps, starting to ramp to full energy.
Beam Loss Monitors: Nothing unusual.
Quench Status: Not real.
Reason: Unexplained at the moment.

From the Physics Logs: 2330: Setup off. Blue Quench Link interlock starting from 3b-ps1 shortly after starting a ramp with 55 bunches. 2342: QLI recovery has begun.

Sunday, Dec 30, 2001: Beam Abort, 2b-ps1 QLI in Blue ring, 2b-ps1 (Actual Time: 23:53:32 +1366415)
QPA Faults: Blue power supplies off, QP11-R2BD2-b2-dhx-qp (Crowbar), Yellow supplies and Tq's remain on.
QD Alarms: None indicated they fired, still in the Running mode.
DX Heaters: None fired, 4b and 10a "Set State" with no indication.
QdRealQuench: No detectors tripped, all in the Running mode.
Postmortems: Appears b2-dho current begins to take off -2.2sec before T=0, then the b2-dho responds as current goes to +80amps at -0.02sec causing voltage to spike to maximum causing a Crowbar Fault.
Qdplots: BDMC=473.44amps, sitting at injection begins to ramp up -3.266seconds before T=0.
Beam Loss Monitors: N/A
Quench Status: Not real
Reason: b2-dhx-qp Crowbar Fault.

Tech Notes: One more day until the new year!